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Technology Changes Everything: Inclusive Tech and Jobs for a Diverse Workforce

Pierce Memorial Foundation Final Report

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TECHNOLOGY CHANGES EVERYTHING

A FORUM ON
**INCLUSIVE TECH AND
JOBS FOR A DIVERSE
WORKFORCE**

OCTOBER 26-27

LOCATION: **BARUCH COLLEGE, NYC**



Cornell University

Introduction and Acknowledgements

This document serves as the final report to the Pierce Foundation for funding to support the design and implementation of a 1.5-day Forum entitled “Technology Changes Everything: A Forum on Inclusive Tech and Jobs for a Diverse Workforce” conducted in NYC on October 26-27, 2017 at Baruch College. The conference idea was conceived to address the need to raise awareness across a number of distinct areas where technology is currently impacting employment outcomes for people with disabilities. The topics ranged from one as straightforward as the critical need for attention on equitably integrating individuals with disabilities into the rapidly exploding tech sector workforce, to the much more nuanced and complex application of algorithmic screening and job-matching tools increasingly used in online job applications and selection processes. Other topics focused on were equitable access to entrepreneurship opportunities, inclusive design in technology-based products and services, and the growing targeted focus of technology sector and tech-intensive industries in affirmative recruitment and hiring of individuals with Autism.

We are immensely grateful to the team of Cornell partners, both individuals and units, who assisted as an advisory group to shape the Forum’s framework and content, and also served as champions in financial support and promotion. We are also indebted to the additional sponsors who came forward to provide further needed financial support for this event, Mychal Jefferson, II, Chairman, Private Bankers and Family Offices, Hamerslag Sulzberger Borg and Jim McCaffrey (ILR '81), Partner BTL Investments. The advisory board members and organizational sponsors are listed separately on the pages following this introduction. A special thanks goes to each of our keynote speakers, panel facilitators, and panelists, who generously contributed their time and expertise to shape the rich content of this Forum, who are listed in the program which includes the agenda as well as bio-sketches of each of these contributors. Visit <http://yti.cornell.edu/technology> to view the program and other materials.

Success of this conference must be accredited to the logistical wizardry of Kate MacDowell, Executive Assistant for the Yang-Tan Institute, who identified an appropriate venue, and took on with fearless enthusiasm the many details to bring the pieces together. Conference marketing materials and promotion were supported by Camille Lee, Peter Quinn, Michelle Sawyer, Michelle Alvord and the creative expertise of YTI Media and Web Team. Finally, thanks go to Hiba Azar, recent 2018 ILR graduate for her assistance in supporting many of the needed logistics such as entertainment identification and initial section drafts of this final report.

Susanne M. Bruyère, Ph.D., CRC
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Theme 1: A Job Changes Everything: Skilling up the Diverse Technology Workforce

Rationale for Topic Selection:

Individuals with disabilities need expanded opportunities to be able to close the employment gap and approximate equitable wage and career advancement opportunities within this population. One way to approach this challenge is to begin to target high growth industries where opportunities for entry and career growth are more robust. The technology sector is one such area. Total employment in “high-tech” industries in the U.S. is currently 28 million workers; approximately one fifth (19%) of all U.S. workers are employed in these “high tech” jobs (Erickson, 2015; Workforce Information Council, 2014). In addition, there are currently 545,000 open jobs in the Information Technology Sector (approximately 12% of all unfilled jobs) (White House, 2015a). The purpose of this panel was to discuss the need for workforce development initiatives that address this need.

Background Efforts in this Area:

In recent decades, leaders and economic developers have begun to turn towards the high technology industry to promote economic growth and advancement. The technology sector is continuously growing. In fact, by 2022, “high-tech occupations will increase more than 63% faster than all occupations,” and, “only 10 of these 161 occupations have medium annual wages below the national median for all occupations” (Workforce Information Council, 2014). However, many Americans are simply not trained, or do not possess the necessary skills for IT positions or other related work (White House, 2015b). Furthermore, only 4.9% of employees in high-tech industries were individuals with disabilities in 2015 (Erickson, 2015).

One of the reasons for this is that there are serious barriers to access to higher education for many individuals with disabilities. Over a third of working-age individuals with disabilities reported that their highest level of education was a high school diploma in 2016, and a mere 14.4% attained a bachelor’s degree or higher (Erickson, Lee and von Schrader, 2018). Without greater educational

attainment, many lucrative, high-tech positions may remain out of reach for individuals with disabilities, especially without the existence of alternative or technical training programs, which may allow an individual to acquire relevant skills through means, which circumvent formal education. Another possible reason for the underrepresentation of individuals with disabilities in the high-tech industry is that these individuals constitute a hidden talent pool. Meaning that, oftentimes, many employers may not be actively recruiting individuals with disabilities due to misconceptions or biases, despite the fact that the individuals may possess the necessary skills. In recent years, there has been a surge in employer-led programs that seek to actively recruit individuals with disabilities, indicating that this previously hidden pool of talent may be revealed and capitalized on. Employers leading these initiatives and their respective programs will be discussed in other panels described in this report.

In order to train and support the movement of persons with disabilities and low-skilled workers into well-paying, tech-positions or paths, President Obama announced the TechHire Initiative in 2015. A total of over \$100 million in grants was awarded to communities and businesses in order to ultimately promote training and equip individuals with the skills required to succeed in rapid-growth sectors, including in tech and healthcare. TechHire emphasized that skills could be acquired not only through degree attainment, but also through coding boot camps, high quality online instruction, industry-certified training programs and more. Over \$125 million was allocated to partnerships that target and train young people aged 17-29, and at least \$24 million was allocated to partnerships that assist other disadvantaged groups which face barriers to employment, including veterans and persons with disabilities (White House, 2015b).

It is necessary to assess how tech-employers have responded to the emergence of programs such as TechHire and whether there has been an increase in hiring of marginalized groups – namely persons with disabilities. According to the AAPD's 2017 Disability Equality Index (DEI) (AAPD, 2017a), many tech-giants, such as Facebook and Uber may still not be prioritizing the hiring of persons with

disabilities or disability inclusion in their workplace. However, several organizations are, including Microsoft, HP and Intel, which are rated amongst the top inclusive workplaces. Furthermore, 95% of companies reporting to the DEI have specific recruitment programs/efforts geared at hiring persons with disabilities, an increase of 11% from 2014 (AAPD, 2017b).

While TechHire may be a viable solution for individuals with disabilities, research suggests that there are other means of securing industry-specific employment. One example is participating in various internships and apprenticeships, as “employers who participate in internship programs for people with disabilities are six times more likely to hire a person with a disability and this practice is more strongly related to hiring than any other identified hiring practice (Erickson, von Schrader, Bruyère, VanLooy, & Matteson, 2014)”. Essentially, by placing individuals with disabilities in technology-focused internships or apprenticeships, they are able to further develop their skills and acquire new skills. Furthermore, individuals with disabilities are more likely to secure permanent employment within their placement organizations after completing internships or apprenticeships. These, and other related ideas to promote opportunities for individuals with disabilities to participate in tech sector employment were discussed on the panel.

Forum Panel Related Activities:

1. On September 17, 2017, preceding the Forum event and because of the Forum to follow, Susanne Bruyère participated in a related eCornell webcast Roundtable entitled “A Special Roundtable: Defining the Brave New World of Independent Work,” about the gig Economy and improving employment outcomes for individuals with disabilities in the tech sector.
2. Susanne Bruyère participated in a Conference entitled “The Many Futures of Work: Possibilities and Perils” held in Chicago October 5-6, 2017, sponsored by the Institute for Work & the Economy. The presentation and related paper were informed by the background research done to inform the Pierce Foundation-funded Forum design and panels and related content is presented in the paper (see <https://static1.squarespace.com/static/5910ee5d1e5b6ca37f0a53b0/t/5a8497eb0d9297891ab548ab/1518639083907/Bruyere+MFW+FINAL+%2812-12-17%29.pdf>).
3. As a result of connections made at the Forum between the NYC Mayor’s Office on People with Disabilities and keynote speaker Pat Romzek, LifeChanger Executive Consultant, Cisco, the NYC

Mayor's Office on People with Disabilities has established a "Cisco Training Academy" to train 2,000 individuals with disabilities in skills that will make them viable candidates for placement in tech sector-related jobs in the NYC metropolitan area. Efforts on this initiative began summer, 2018.

4. Susanne Bruyère participated on November 17, 2017 in a Twitter Chat hosted by the American Psychological Society Public Interest Directorate entitled "Exploring Wage Inequalities among Individuals with Disabilities." In a TweetReach report, 59,214 accounts were reached with 1,008,449 impressions.

Theme 2: Where Difference Contributes to Business Differentiation: Neurodiversity in the Workplace

Rationale for Topic Selection:

While the employment participation rate gap between Americans with and without disabilities remains significant (approximately 79% for those without disabilities to 36% for those with disabilities) (Erickson, von Schrader & Lee, 2018), there has been a recent surge in the number of businesses that have begun to actively recruit and hire employees with Autism. The largely untapped talent pool of neurodiverse individuals are now being actively recruited by tech sector and tech-intensive industries. The interest has been spurred by a recognition that individuals with autistic characteristics may possess an array of skills and abilities that can be valuable for select tasks where attention to detail and focus are needed. For example, individuals who are Autistic may have exceptional problem-solving skills and hyper-focus abilities, which are necessary assets for data analysts, computer coding, or cyber security analysts to possess. With this in view, a number of employers have begun to capitalize on the opportunity to affirmatively recruit, screen, train and hire neurodiverse individuals. The purpose of this panel was to highlight these emerging initiatives.

Background Efforts in this Area:

Efforts to ensure and promote the employment of neurodiverse individuals are essential. In the United States alone, the prevalence of Autism has jumped by 119.4% from 2000, being the fastest growing developmental disability and present in 1 in 59 births (CDC, 2018). According to a study conducted by Drexel University, paid, community-based employment is only acquired by 14% of adults on the Spectrum, while more than 54% of individuals on the Spectrum participate in unpaid activity, typically in a facility with mostly other workers with disabilities. The remaining one-fourth of surveyed individuals on the Spectrum had no work or day activities (Roux, Rast, Anderson, & Shattuck, 2017). Despite these rates, the 2014-2015 NCI Adult Consumer Survey (NCI, 2015) reported that 50% of

unemployed self-respondents on the Spectrum desired to work, further emphasizing the necessity and importance of these neurodiverse hiring initiatives.

SAP, a leading software company, launched their groundbreaking Autism at Work program in 2013 with the objective of integrating individuals with Autism into their workforce. By 2020, SAP's goal is to employ 650 individuals on the spectrum, which is 1% of their total global workforce. According to José Velasco, the head of the Autism at Work program, the organization has currently hired approximately 130 individuals who are on the Spectrum for over 35 positions, including in programming, software and data quality assurance. In order to further their reach, SAP has hosted two Autism at Work Summits and plans to host a third in April 2018. The purpose of these summits is to present attendees with the best practices that leading organizations are utilizing to effectively hire qualified neurodiverse candidates. The hope is that attendees, which may be leaders in their respective organizations, will implement similar practices or programs in their firms, ultimately increasing the aggregate number of neurodiverse individuals hired (Schuller, 2017). Along with the Autism at Work Summits, an Autism at Work Employer Roundtable has been established, headed by the United States Business Leadership Network (USBLN), and includes six key companies -- SAP, DXC Technology, Ernst & Young, Ford Motor Company, JPMorgan Chase & Co. and Microsoft. According to Jill Houghton, president and chief executive officer of USBLN, which seeks to represent business, the network powers the Roundtable partly due to the surge in the number of requests they have received from organizations wanting to connect with each other regarding Autism hiring initiatives (Kubik, 2017). The Roundtable fosters an environment of open communication, allowing employers to share their best practices and findings for various Autism hiring initiatives with the hopes of further developing existing programs and knowledge. To expand the scope and aide in the success of the various hiring initiatives employed by numerous companies, the Roundtable engages with Autism communities and various academic communities to raise awareness of their programs. Through their efforts, members of the Roundtable hope to reduce

the unemployment rate for individuals on the Autism Spectrum. It is important to understand that, according to James Mahoney, executive director, head of Autism at Work, JPMorgan Chase & Co. that Autism at Work hiring initiatives are not merely charitable; instead, they are simply another means of sourcing and acquiring strong talent for these organizations (Kubik, 2017).

To highlight some of the efforts to actively recruit individuals on the Autism Spectrum following SAP's initiative in 2013, consider programs undertaken by Microsoft, DXC Technology and Ernst & Young (EY). In 2015, Microsoft initiated a pilot program with Specialisterne, an employment agency that specifically trains and finds positions for individuals on the Autism Spectrum (Microsoft, 2015). Through their continued collaboration with Specialisterne, Microsoft seeks to hire more individuals with autism for full-time positions in their organization. DXC Technology, in collaboration with Specialisterne and the Australian Department of Human Services, launched the Dandelion Program in 2014. The Program aims to equip individuals on the Autism Spectrum with valuable Information Technology (IT) skills and careers. Thus far, the program has helped 55 individuals on the Spectrum secure employment in the areas of data analytics, software testing, and cyber security. However, according to DXC, "the Dandelion Program is not just about employment, it is about building employability for the trainees" (DXC Dandelion Program, *n.d.*). EY launched their neurodiversity program in 2016 in its Philadelphia office. Partnering with Specialisterne, and the Arc, EY brought in four neurodiverse employees to join neuro-typical employees in March 2016 in their account support services team. Training was provided to staff and supervisors on how to effectively communicate with individuals with Autism and to create a comfortable space during the interview process. According to Lori Golden, Abilities Strategy Leader, Americas Talent Team at EY, "If you can be clear, simple, straightforward and logical to people with Autism, you're generally going to be better at communicating with anyone." (Madhavan, 2016).

Forum Panel Related Activities:

The Yang-Tan Institute has had a several-year relationship with a number of the companies who are leaders in the emerging Autism hiring initiatives. Because of these relationships, the YTI team was successful in designing this panel and recruiting company leaders to represent their organization's initiative at this event. Some of the following related initiatives have flowed from this event, but were not necessarily originated there. While were inspired by the Forum connections, many were spurred as continuing efforts and were reinforced by relationships that led to relevant outcomes as follows:

1. Development of an online portal held with DigitalCommons@ILR for DXC Technologies that serves as a repository of the materials and videos related to their Autism at Work Program (the Dandelion Program). This can found at <https://digitalcommons.ilr.cornell.edu/dandelionprogram/>
2. Development of a two-credit course entitled *Workplace Disability Inclusion: Innovations and Initiatives (Autism at Work)* (ILR HR 4657) offered second half of fall 2017. The class was registered to room capacity (32), with an extensive wait list and will be offered again fall 2018 and fall 2019.
3. Engagement of panelists as speakers in the *Workplace Disability Inclusion: Innovations and Initiatives (Autism at Work)* (ILR HRS 4657) – representatives from the related Forum panel from JPMorgan Chase & Co and SAP served as in-person presenters in this course.
4. Development of a spring 2018 credit internship for eight ILR undergraduate students in five of the leading companies with Autism at Work Initiatives: DXC Technologies (Melbourne, Australia); EY (NYC), JPMorgan Chase & Co (Wilmington, Delaware), Microsoft (Seattle, WA), and SAP (Newtown Square, PA). Students received eight credits for the internship and an additional four credits for a related independent paper (12 credits total). This internship will be offered in 2019, and possibly expanded if more companies offering Autism at Work programs agree to participate.
5. Development of a four-credit Directed Study (ILR HR 4990) for ILR undergraduates participating in the spring 2018 Autism at Work company internships, entitled *Directed Study and Internship on HR (Workplace) Policies and Practices to Facilitate Successful Corporate Autism at Work Programs*.
6. Four ILR School undergraduate student summer 2018 internships with an Autism at Work focus with SAP (Newtown Square, PA) and DXC Technologies (NYC).

7. A Cornell, DXC Technologies and CUNY partnership to explore the development of a "Neurodiversity Hub at CUNY", using a Neurodiversity Hub prototype designed by two ILR undergraduate interns who were in internships at DXC Technologies (Melbourne, Australia) in spring 2018.
8. A blog written for SHRM HR Executive on the topic of "Talent Management" which focused on affirmative recruitment of individuals with Autism and the role that HR professionals can play in facilitating workplace inclusion for this group. This blog can be found at <https://blog.hrps.org/blogpost/Disability-and-HR-Strategy-Targeting-Neurodiversity-for-Your-Talent-Pool>
9. A spring 2018 interview in the *Financial Times* for a "Special Report on Modern Workplace: Disability" where the Autism at work initiatives were referenced in Susanne Bruyère's interview; see <https://www.ft.com/content/6ac33f70-3d73-11e8-bcc8-cebcb81f1f90>
10. A related chapter on Autism at Work Initiatives and the implications for labor and employment relations professionals in a volume on disability and employment of the Labor and Employment Relations Association (LERA), to be published in early 2019.
11. A 2017-2018 Honors Thesis for a senior ILR School honors student, Alexis Pollito entitled *Supporting Neurodiversity in the Workplace: The lived experience of individuals with Autism* that Thomas Golden and Susanne Bruyère served as ILR faculty sponsors/advisors for.
12. Michael Fieldhouse, Director of DXC Dandelion (Technologies Autism at Work) Program (spent a two week study visit at Cornell University, April 2018. Michael explored collaborative projects with Cornell University staff and also addressed a meeting of Cornell Career Services staff, about the needs of students with Autism for enhanced employment preparation support and DSC Technology's efforts to date in this area.
13. Cornell YTI join an as a partner in an Autism CRC Innovation project funded on Autism at Work with Anna Krzeminska, Associate Professor, Department of Management, Faculty of Business and Economics, Macquarie University, also including project partners at the universities of LaTrobe (Australia), Ivey (Canada), Curtin (Australia), as well as DXC Technologies, and the Autism Spectrum Organization of Australia.
14. Preliminary development of two research projects with SAP on effective workplace practices that facilitate neurodiversity inclusion.
15. A presentation in July 2018 to the Stanford University Special Interest Group on Neurodiversity on the topic of workplace disability inclusion policies, practices, and implications for Autism at work initiatives.

16. A presentation in August 2018 at Vanderbilt University to the NSF Convergence Workshop on the topic of workplace disability inclusion policies and practices, and implications for Autism at work initiatives.
17. Two internships for ILR undergraduate students Nicholas Martin and Christopher Rogers in Summer 2018 at CUNY on the Neurodiversity Hub Feasibility Study in conjunction with CUNY, Cornell University, DXC Technology and Untapped.
18. Successful presentation acceptance at the Council for Exceptional Children Division of Autism and Developmental Disabilities 2019 Conference to be held January, on the topic of "Partnerships to Improve Employment Outcomes for Autistic Students." Collaborators included:
 - Barbara Bookman, University Director, Disability Programs, City University of New York (CUNY)
 - Michael Fieldhouse, Director, Emerging Business and Federal Government, DXC Technology;
 - Anthony Gartner, Associate Director, Student Equity and AccessAbility Services, Swinburne University of Technology;
 - Deb McDonald, Associate Director, Student Professional Development, Careers & Employability, Swinburne University of Technology
 - Andrew Eddy, Director, Untapped Group, Melbourne
 - Mitchell Butler, Cornell University, ILR School undergraduate student
 - Christopher Rogers, Cornell University, ILR School undergraduate student
19. Keivan Stassun, Stevenson Endowed Professor of Physics & Astronomy, College of Arts & Science, Vanderbilt University, and parent of a young child with Autism, who is spearheading a remarkable campus- and community-wide initiative to improve educational and employment outcomes for people with Autism in an NSF-funded project will address invited Cornell University faculty and staff on October 2, 2018.

Theme 3: Entrepreneurship, Technology and Disability

Rationale for Topic Selection:

Many individuals with disabilities have great interest in pursuing self-employment and entrepreneurship because they are employed in the open labor market at a lower rate than individuals without disabilities, thus facing a higher poverty rate. In fact, in the U.S. and Europe, self-employment rates are generally higher amongst persons with disabilities than those without disabilities (Kitching, 2014). The purpose of this panel was to explore the nature of the disparity of opportunity for individuals with disabilities who want to be entrepreneurs, the resources available to them, and needed policy and practice changes to facilitate increased opportunities in this area.

Background Efforts in this Area:

In spite of the high interest in entrepreneurship, as highlighted by the Chicagoland Entrepreneurship Education for People with Disabilities (CEED), which seeks to develop comprehensive education and training programs for individuals with disabilities and service providers, disability employment statistics and data that is specific to entrepreneurship is not collected. Therefore, while it is known that approximately 10% of the general population is engaged in some form of entrepreneurship, the rate for entrepreneurs with disabilities is not measured precisely, but can be speculatively estimated to hover around 15% (CEED, 2015). Kate Caldwell, a lead project member of CEED, emphasizes that there is a notable difference between entrepreneurship and self-employment, albeit the two are oftentimes incorrectly used interchangeably, especially in data gathering. The difference is that self-employment is meant to achieve self-sufficiency, whereas entrepreneurship, which is both profit- and growth-oriented, is meant to support the individual him/herself (entrepreneur) and others (employees). Furthermore, self-employment is not an anti-poverty strategy, as it is only intended to sustain one individual (the self-employed individual), while entrepreneurship is an anti-poverty strategy, sustaining the entrepreneur and his/her employees.

While there are many benefits to entrepreneurship for individuals with disabilities, there are also serious barriers faced by potential entrepreneurs with disabilities. One barrier mentioned by Kitching (2014), a researcher at Kingston University, is access to start-up capital, meaning that many entrepreneurs with disabilities have difficulty financing new start-ups. Another barrier is the potential lack of relevant business knowledge/skills acquired by the individual with a disability, which may be due to limited education/prior related training, experience, and/or a lack of confidence. Other barriers faced by individuals with disabilities to successful entrepreneurship include consumer discrimination, the absence of appropriate business support, and the benefits trap, or fear of loss of security/benefits, such as income (Kitching, 2014).

As previously highlighted, possibilities may arise for entrepreneurs with disabilities, yet funding for support services that work to eliminate barriers and offer entrepreneurial training and support is limited. For example, “of the \$429 billion in federal and state funding allocated toward supports and services for working age people with disabilities, only 5% was directed toward programs to improve employment and economic independence” (CEED, 2015). Further, of the 22 government programs that provide employment services that include entrepreneurial training, only 14% offer the service to more than half of their participants (CEED, 2015).

Despite limited funding, several resources may help individuals with disabilities successfully start and operate their own businesses. For example, the Job Accommodation Network (JAN), a service of the U.S. Department of Labor’s Office of Disability Employment Policy (ODEP), offers mentoring, consulting and technical assistance to individuals with disabilities who wish to start their own businesses (JAN, *n.d.*). There are numerous grants from the government for which entrepreneurs with disabilities may be eligible. For example, the U.S. Small Business Administration (SBA) provides limited grants specifically for small business owners with disabilities (SBA, *n.d.*). There are also various non-profit organizations or private entities which serve as a resource for entrepreneurs with disabilities, such as the Disabled

Businesspersons Association (DBA), for example. Prior to their formation in 1985, “there were no known sources for self-employment or business ownership information and assistance – as an employment option – for disabled veterans or others with disabilities” (Disabled Businesspersons Association, *n.d.*). Today, the DBA produces educational programs and services through collaborating with vocational rehabilitation specialists, educators, and business advisors. Another notable organization that serves as a resource for entrepreneurs with disabilities is 2Gether-International. Founded by Diego Mariscal, an entrepreneur with a disability, 2Gether-International produces advocacy campaigns and projects to empower entrepreneurs with disabilities. One of their current projects will assist up to five individuals with disabilities in their entrepreneurship endeavors via the supply of consulting, PR and social media support, crowdfunding mentoring and more. (2Gether-International, *n.d.*).

Through a combination of determination, the help of family and friends and, at times, the utilization of the aforementioned resources, many individuals with disabilities are able to become successful entrepreneurs. One of these entrepreneurs is Chris Tidmarsh, who is on the Spectrum and co-owns Green Bridge Growers, a commercial greenhouse in Indiana. As with any other business, Green Bridge Growers has a unique mission, one in which there is a great emphasis on training other individuals with Autism. Initially, Tidmarsh received a \$15,000-prize from Notre Dame’s Mendoza Business School for his business pitch. As the idea developed, the Tidmarsh family secured grants from the U.S. Department of Agriculture to buy a 5-acre farm in order to execute their plan. Currently, Tidmarsh mentors other individuals on the Spectrum at Green Bridge and explains that, “it [Green Bridge] does provide hope not just for me, but others on the autism spectrum to find and keep jobs” (Ansberry, 2017). Another entrepreneur is Brian Martin, who founded Hardback Yoyo over 6 years ago, an eco-friendly business that uses discarded media to create writing journals and other items. According to Martin, who is on the Spectrum, “a customized job is always the best way for me to accentuate my strengths” (Martin, *n.d.*).

By highlighting success stories like these in the media, it is hoped that the stereotypes and stigma that has historically precluded people from marginalized communities, such as individuals with disabilities, can be lessened significantly. This panel focused on this, and a variety of other ways, such as training, mentoring, and financial support through loan programs, that entrepreneurs with disabilities can be given the opportunity to initiate their business, thrive, and employ others who are looking to be gainfully employed in their communities.

Forum Panel Related Activities:

1. We sparked interest in an Entrepreneurship at Cornell Advisory Board member, Mychal Jefferson, Chairman, Private Bankers and Family Offices, Hamerslag Sulzberger Borg in sponsoring our Forum reception event. Mr. Jefferson has expressed interest in financially supporting similar such events.
2. On November 6, 2017, Paolo Guadiano, founder of Aleria and the center for Quantitative Studies of Diversity and Inclusion (QSDI) at the City College of New York and facilitator of the panel on Entrepreneurship, Technology and Disability at the *Technology Changes Everything* Forum; delivered a blog on Forbes entitled *Accenture, EY, Google, Microsoft, and other Leaders find Great Value in Employees with Disabilities* (<https://www.forbes.com/sites/paologuadiano/2017/11/06/workforce-disability-conference/#2f674dffa5e2>). As of July 10, 2018, there have been nearly 4,700 views of the article.
3. In November 2017, Susanne Bruyere was interviewed in *Entrepreneur* on an article, *Why Microsoft, Chase, and Others are hiring more People with Autism* (<https://www.entrepreneur.com/article/302110>), and referred the editor to Rajesh Anandan, CEO & Founder of Ultratesting and Forum panelist. As of July 10, 2018, the article has been shared nearly 4,000 times.
4. The Yang-Tan Institute sponsored a panel entitled “Disability and Entrepreneurship” at the spring *Entrepreneurship at Cornell Celebration* event on the Cornell University Ithaca campus, April 29, 2018, including panelists Naitik Mehta, CEO & Founder of NextBillion, Oliver Thornton, Co-Founder & CEO of Coding Autism, and Jim McCaffrey (ILR 81), Partner BTL Investments
5. The Yang-Tan Institute engaged Rajesh Anandan, CEO & Founder of Ultratesting in ILRHR 4657, *Workplace Disability Inclusion: Innovations and Initiatives (Autism at Work)* to guest lecture to a cohort of 32 undergraduate students.
6. Over the summer of 2018, the Yang-Tan Institute worked with an internally sponsored summer student research fellow to conduct literature scans on evidence-based interventions that create a more inclusive workplace and how to measure that for people with Autism. The student

research fellow also conducted a literature scan on different model of job coaching and coaching skills that are effective. These scans will be delivered to Rajesh Anandan, CEO & Founder of Ultratesting in late July 2018 for his review.

Theme 4: Inclusive by Design

Rationale for Topic Selection:

Persons with disabilities often face real barriers to access, whether it be access to information or physical access to buildings. As highlighted in the Cambridge Disability Law and Policy Series in the *European Journal of Current Legal Issues*, as both public and private institutions increasingly begin to rely on technology to provide services and relay information to individuals, any group of individuals that is unable to access said technology will, as a result, find itself further marginalized (Easton, 2014).

According to a report produced by the Department of Commerce in 2002, persons with multiple disabilities aged 25-60 are almost half as likely to have access to the internet as individuals without disabilities, illuminating the disparity that exists between the two groups' general access to the internet (Bruyère, Erickson, & VanLooy, 2005). Furthermore, for those who do have access to the internet, many websites remain inaccessible. In fact, a study conducted in 2001 found that two-thirds of evaluated sites contained major "show stopper" accessibility issues, which could ultimately prevent persons with disabilities from accessing the information, despite having access to the internet (Jackson-Sanborn, Odess-Harish, & Warren, 2001). The purpose of this panel was to bring industry and academic representatives together to discuss and raise awareness about current challenges and opportunities to make accessible and inclusively designed technology products and services a universal pursuit.

Background Efforts in this Area:

In the United States, various pieces of legislation have been passed in an attempt to alleviate the barriers posed by technology in accessibility. An example includes the Workforce Investment Act of 1998, which mandates that federal departments and agencies ensure that their employees with disabilities have equal access to information as employees without disabilities do. Another example is Section 508, which mandates that individuals with disabilities who seek information or services from a federal agency also have equal access as those individuals without disabilities do (U.S. Access Board, 1999). Legislation addressing physical accessibility has also been passed. Despite these legislative

attempts, however, the barriers remain serious and increasingly urgent as the rate of disability increases. Along with legislation that seeks to remove barriers to technology access, the World Wide Web Consortium (W3C) is working to abrogate website-accessibility barriers. In line with W3C's design principles, which emphasize 'Web for All', alluding specifically to web accessibility, they have established the *Web Accessibility Initiative* and produced a list of web accessibility laws and policies that should be followed (W3C, 2016). W3C also generates and provides tutorials on web accessibility for creators of web content to ensure the creation of content that is accessible to persons with disabilities and generally user-friendly. W3C has assembled other various other tools, including 'Easy Checks,' a resource to help organizations and individuals assess a web page's accessibility (Web Accessibility Initiative, 2015). While there has been success in improving web accessibility, barriers remain, making it difficult for persons with disabilities to receive information.

Due to the aforementioned inaccessibility of buildings, public transport, and information, coupled with the general incorrect assumption about their inability to work, an estimated 1 billion persons with disabilities worldwide find it difficult to acquire employment (ILO, 2014). Technology, however, has been quite powerful in promoting inclusion through new, innovative design. For example, advancements in information technology and assistive devices have allowed individuals with disabilities to work with the flexibility that they may require. Numerous institutions have been created to support the increased accessibility of said technologies. For example, the Global Initiative for Inclusive Information and Communication Technologies (G3ict) was established in 2006 by the UN Global Alliance for Information Communication Technology and Development in coordination with the Secretariat of Convention on the Rights of Persons with Disabilities. G3ict seeks to improve the accessibility of Information Communication Technologies (ICTs) and assistive technologies mainly through reliance on the expertise of their growing, international network of ICT accessibility experts, who develop good practices, technical support and benchmarks for ICT accessibility advocates around (G3ict, 2016).

Along with the creation of institutions that seek to maintain and further the accessibility and reach of technology, numerous institutions and initiatives have also been formed to develop new technologies or products that are inclusive by design. Unlike the typical “solutions” to inaccessibility provided today, which are retrospective in nature and merely provide an, at times, costly adjustment to a product, universal design requires a fundamental shift in the mindset of developers to prioritize inclusion and accessibility from the origins of the development, ultimately removing the need for a “solution” altogether. Not only have new institutions with the primary goal of inclusive product development been established, but many existing organizations have also allocated resources to the development of new inclusive products. As highlighted by Alan Brightman, the founder of Apple Computer’s Worldwide Disability Solutions Group, Apple has been working to further the accessibility of their products for decades, prior to the issue of accessibility being on any other organization’s radar. The Worldwide Disability Solutions Group (WDSG), comprised of Apple employees and engineers, was established in 1985 with the goal of ensuring that each Apple product and accessibility plug-in was able to fulfill the needs of persons with disabilities. Although Apple’s WDSG was abolished in 1998, as explained by Apple spokesperson Rhona Hamilton, the company is “still very much interested in disabilities solutions” (Tedeschi, 1998) and actively works to strengthen the accessibility of their products. The Apple Watch, for example, employs fitness algorithms designed for wheelchair users, allowing individuals with limited mobility to utilize the ‘Workout’ and ‘Activity’ apps (Apple, 2017). In addition to Apple, IBM has also been dedicated to accessibility for decades, explaining that they are “committed to bringing technology to people with disabilities” (IBM, 2008). Through IBM’s “Accessibility Research”, the organization has been eliminating barriers to technology and information, along with inventing new technologies to enhance the human experience. For example, recognizing the lack of access to transportation that many people with disabilities face, IBM has partnered with Local Motors and the Consumer Technology Association to create the world’s most accessible, self-driving vehicle.

Both IBM and Apple emphasize inclusive design in their organizations and products, giving them an edge to their competitors.

Along with organizations that have historically promoted accessibility, such as Apple and IBM, other organizations have realized the importance of incorporating accessibility in their products as well. Microsoft, for example, has committed to inclusive design, pointing to their mission statement, which highlights their goal to “empower *every person on the planet* to achieve more” (Microsoft, 2017). Their inclusive design principles include: ‘recognize exclusion’, ‘learn from diversity’, and ‘solve for one, extend to many.’ Microsoft has established a ‘design toolkit,’ a comprehensive resource for design teams to utilize that promotes inclusive design and universal solutions. They have also offered videos that are meant to “shift your design thinking, and put humans first” (Microsoft, 2017a). While producing resources for design teams to promote inclusivity by design, Microsoft has simultaneously developed their own inclusive technology through partnerships across their internal teams and outside partnerships with schools, nonprofits, filmmakers and other organizations who strive to design inclusively. Led by their core belief that “there are no limits to what people can achieve when technology reflects the diversity of everyone who uses it,” (Microsoft 2017b). Microsoft is successfully working to develop an ‘Inclusive Skype’ and ‘Inclusive Xbox’. They are also working on numerous other projects, including the design and development of OneNote Learning Tools, which aid in learning.

Along with Microsoft’s various initiatives, the Oath Accessibility Labs in Sunnyvale, CA and New York City, allow visitors to perform tasks while they experience a simulated disability. The initial prototype was established in 2007 with the hopes of ultimately highlighting any potential barriers to accessibility that a product may pose (Oath, *n.d.*). As designers and engineers participate in the Lab, they are able to garner a greater understanding of varying user experiences, and thus, are able to design and create products that are inclusive of all abilities. Oath also hosts “User Nights,” in which developers essentially examine how individuals with disabilities use assorted Oath products in order to solve any

potential accessibility issues that arise. Increasingly, organizations, such as Microsoft and Oath, are prioritizing accessibility; furthermore, as highlighted, these organizations are relying on individuals with disabilities themselves and their unique experiences to shape product design and development.

Other organizations are also involved in the shift to inclusion by design, including Google, which sponsored a 3-day Makeathon at San Francisco's TechShop in 2015. The primary objective of the event was to create open-source designs that can be easily and cheaply replicated by others. Approximately 100 volunteers were in attendance and were divided into project teams comprising of designers, developers, engineers, makers and a "needs knower," an individual who proposed a specific project or product idea. The teams worked together to design and produce working, adaptive technology prototypes (Said, 2015). Google has also authorized other initiatives, including the Google Impact Challenge: Disabilities, in which Google allocated \$20 million to 29 nonprofits who are working to create technology to abolish a variety of accessibility barriers (Google 2016a). Organizations include World Wide Hearing, a developer of inexpensive tools that screen for hearing loss, The Arc, a developer of tools that allow individuals with cognitive disabilities to find suitable technology that will allow them to reach their goals, and many others (Google, 2016b).

Forum Panel Related Activities:

A number of related activities led up to the formulation of this panel and have flowed from it since October 2017 Forum as follows:

1. Megan Lawrence, Accessibility Technical Evangelist, Microsoft, and Susanne Bruyere, YTI Director, collaborated on the submission of a "challenge" to the Cornell Tech Design Studio for MBA graduate students on the topic of "how to create a marketing strategy to pitch inclusive design to companies as a differentiator in innovative and enhanced business opportunity in user interface design." The submission was not selected for the course.
2. Computer and Information Sciences Dean, Greg Morrisett and Susanne Bruyère
3. Collaborated on a submission to "Teach Access" (<http://teachaccess.org/>) to have Cornell become an education organizational member. The application was accepted and Dean Morrisett and Susanne will serve as representatives to Teach Access for the coming year,

while additional Cornell University representatives (faculty and staff) are identified for further involvement.

4. Susanne Bruyère is participating in a Teach Access task group working summer 2018 on the design of materials (PowerPoint and talking points in a fact sheet) to be used with university administrators and faculty to promote the idea of inclusive design adoption in courses. Other members of the task group include representatives from Stanford University and the User Experience Strategy Team of The Paciello Group (accessible design consultants).
5. Since October 2017, Susanne Bruyère has reached out to over a dozen Cornell faculty and instructional staff teaching in Computer and Information Sciences and Human-Computer Interaction Design courses and had individual one-on-one meetings with many to inquire about the inclusion of accessible technology design in these courses.
6. As a follow-up to one such conversation, Kyle Harms, lecturer in computer and information sciences, will now be more explicitly including an accessible design focus in his related CIS fall course, as well as in a related eCornell series of six courses being designed summer 2018. Susanne is providing resources and connection to industry experts on the topic who can possibly serve as interviewees in eCornell videos that will be included in the courses.
7. In the spring of 2018, several YTI staff have served as a resource to an on-campus conversation led by Shannon Osburn, Cornell Information Technology Assistant Director, for a task group focused on *University Website ADA Conformance* and how to make Cornell University products and services more accessible to persons with disabilities.
8. On August 7 2018, Wendy Strobel Gower of YTI's Northeast ADA Center and Diversity Partners projects will participate on a discussion panel at the inaugural Cornell University Accessibility Camp. She will speak to legal issues concerning accessibility in higher education.
9. YTI staff collaborated with Technion Jacobs Institute Cornell Tech faculty (Shiri Azenkot and Wendy Ju) on the development and submission of two National Science Foundation (NSF) technology and human interface grant solicitation proposals in June 2018. The proposals were entitled: a.) *Enhanced Perception Systems for Including People with Low Vision in the Workforce*, and b.) *Gearbox: Using Humans in the Loop to Prototype Collaborative, Augmented and Amplified work*.

Theme 5: Diversity and Inclusion Considerations in the use of Recruitment, Online Screening, Selection, and Job Matching Tools

Rationale for Topic Selection:

Business processes and internal organizational operations are increasingly becoming more technology-intensive and this trend is predicted to only grow into the future. Therefore, it is no surprise that the recruitment and applicant screening processes today are increasingly digital. Partly in an attempt to deal with the many thousands of online applications that most employers now face, many organizations have turned to online recruitment, or e-recruitment to source their applicants. These tools may also offer an opportunity to combat hiring bias. According to Frida Polli, co-founder of *Pymetrics* and a panelist at the Cornell October 2017 Forum, “you can remove bias from an Algorithm, but it’s impossible to remove from humans (Pymetrics, 2017)” Unfortunately, however, dependence solely on traditional e-recruitment, which typically utilizes algorithmic tools to scan resumes or applications, can sometimes accentuate employer biases or even generate new biases. The purpose of this panel was to highlight both the challenges and opportunities that these rapidly proliferating online tools present to the application, screening and hiring processes for individuals with disabilities.

Background Efforts in this Area:

According to a study published by the National Bureau of Economic Research (2015), employer bias in hiring is one of the key pieces to understanding the low employment rate for individuals with disabilities (Ameri, Schur, Adya, Bentley, McKay, & Kruse, 2015). Contrary to popular belief, the aforementioned study also concluded that higher qualifications do not eliminate the disadvantages faced by individuals with disabilities in the labor market. Dozens of studies have highlighted that bias occurs in the hiring process, whether in the interview portion itself or in the various screening processes.

According to Madan Pillutla, a professor of organizational behavior at the London Business School, there are three main biases that interviewers can possess. That is, interviewers may: 1.) Gravitate toward people who are similar to them; 2.) Base decisions on stereotypes about people's competencies; 3.) Are wary of anyone who they perceive as a threat to their status in their organization (Lebowitz, 2015). These forms of bias are likely also to be operating in the interviewing and screening processes for applicants with disabilities, who may often be perceived as 'different'. More specifically, a team of researchers at the Wharton School identified three obstacles to hiring which persons with disabilities face, including a lack of external hiring support for the employer, or a lack of outside resources to help the employer recruit individuals with disabilities, a lack of internal hiring support, and negative perceptions by the employer (Knowledge@Wharton, 2013). Thus, it is not surprising that employers expressed interest 26% less often in individuals who disclosed a disability in their cover letter (Devlin, 2016).

Thus, it is imperative that we explore new ways to address interviewer/screening bias in the hiring process, as it impacts both opportunities for individuals with disabilities to be considered for jobs and employers abilities to access this often largely untapped labor source. To realize the potential benefits of online recruitment and screening, platforms and related tools must be accessible to this population. E-recruitment poses an array of barriers for individuals with disabilities: first and foremost, as previously explained in Theme 4, individuals with disabilities may have limited access to the internet, posing a serious problem to access of online job-applications altogether. Without access to the internet, individuals with disabilities do not possess the necessary ability to even access the application platform, and therefore, are not considered for the position. With the rate of employment already lower for persons with disabilities, it is imperative to address the matter of general internet accessibility.

Furthermore, not only are individuals with disabilities only half as likely to have access to the internet as individuals without disabilities, but, due to the inaccessibility of many websites and job

applications, those that do are oftentimes unsuccessful in navigating e-recruitment. A survey of job seekers with disabilities conducted by the Partnership on Employment & Accessible Technology (PEAT), an organization that seeks to promote the employment, retention, and career advancement of people with disabilities, found that 67% of survey respondents have been asked to complete pre-employment testing or assessments. Results show that 46% of survey respondents rated their last experience applying for a job online as ‘difficult to impossible,’ with 9% unable to complete the application and 24% requiring assistance from the employer. Of those applicants who received assistance from the employer, 58% reported that they were still unable to finish the application. Due to the digital barriers faced, including navigation difficulties, poor color contrast, timeouts, graphics without alternative text descriptions and other issues, 40% of all respondents who were required to complete tests or other assessments could not do so independently (PEAT, 2015). According to Essential Accessibility, all of the aforementioned barriers could have easily been remediated had the Web Content Accessibility Guidelines (WCAG) been followed (Essential Accessibility, 2017).

In addition to the lack of access to the internet and website inaccessibility, screening tools and assessments themselves pose barriers to individuals with disabilities and are often discriminatory by design. It is necessary to mention that while Title VII of the Civil Rights Act, the Americans with Disabilities Act and the Age Discrimination in Employment Act all prohibit discrimination in employment testing, the Equal Employment Opportunity Commission (EEOC) allows the use of ‘fair’ tests and other procedures in screening qualified applicants for a job, as long as the tests do not discriminate on the basis of race, color, sex, religion, disability, national origin, or age (EEOC, 2010). While many employers may not intentionally discriminate, their seemingly neutral screening tools or procedures do in fact turn out to be discriminatory in their effect, resulting in disparate impact, which is prohibited by federal law (Parlante, 2008). Parlante advises employers to refer to the EEOC’s list of “best practices” when utilizing

hiring tests or screening devices, which mandate that any tests or procedures used be job-related and appropriate and offer other recommendations.

Today, human resources managers increasingly rely on data-driven algorithms to aid in hiring decisions. As previously stated, screening tools and assessments may result in the exclusion of already-marginalized groups. One way this can manifest is through the sole use of such algorithms to discover talent. An issue which arises when, as cited in a piece by the Harvard Business Review (HBR), is that approximately 72% of applicants are screened out before a human ever sees their resume – many of these applicants being people with disabilities (Mann & O'Neil, 2016). Algorithms are not neutral by design and oftentimes reflect existing biases for what an ideal candidate looks like. Essentially, when hiring decisions are made based solely on an algorithm, protected classes under employment law may be excluded from the workforce. In order to mitigate the disparity created by algorithms, Mann and O'Neil (2016) recommend a shift from algorithmic hiring to mixed human-algorithmic hiring, in which there is less dependence on algorithms or a restructuring of current hiring algorithms en masse. Within algorithmic-hiring, discrimination can manifest through tests and assessments, meaning even without overtly utilizing an algorithm to screen resumes, an employer may still have a discriminatory hiring process.

Similar to organizations discussed in Theme 4, which have been established to raise awareness about accessibility and inclusive design, many other revolutionary organizations have been launched with the sole purpose of transforming e-recruiting. One of these organizations, *Pymetrics*, was founded in 2012 by Frida Polli and Julie Yoo and uses neuroscience games and bias-free AI to match individuals with jobs. The company's claim is that through the removal of bias from algorithms, via game design, blind auditions and statistical tools, *Pymetrics* hopes to ensure that individuals are not excluded from the hiring process based on recruiter bias. Essentially, partly through gamifying the assessment process, *Pymetrics* reports being able to collect objective behavioral data on applicants in a unique way that does

not necessarily result in the exclusion of individuals with disabilities, or other individuals, who may have otherwise been excluded by traditional screening tools. For example, *Pymetrics* is currently building analytical models and assessment tools that seek to ultimately match individuals with autism, ADHD or dyslexia with jobs in which they will thrive. According to Polli, companies that utilize Pymetrics hiring tools have noted significant improvements in both the diversity and quality of candidates.

Other organizations also beginning to address these issues and transform e-recruitment to bypass bias, include companies such as *HireVue* and *Logi-Serve*. Representatives from these companies also served on the related Forum panel, as did a representative from *ROIKOI*. *ROIKOI* services are designed to tackle unconscious bias via algorithmically matching candidates to relevant positions and employers, while simultaneously maintaining that the potential employees name, photos, and identifiable traits are hidden (ROIKOI, 2017). *HireVue*, on the other hand, works to minimize bias by promoting the use of flexible, digital standardized interviews, which allow for a fairer assessment of all applicants (HireVue, 2017). According to Jeff Facticeau, the executive vice president of science operations at *Logi-Serve*, another organization focused on diversifying the workforce, not only do applicants benefit from the use of non-conventional screening tools, but employers do as well, as they are able to access talent pools that would have been excluded previously (Logi-Serve, 2017).

Forum Panel Related Activities:

1. Cornell Tech and Cornell College of Business co-sponsored an event entitled the "Digital Transformation Summit: Changing Business, Changing Education, Changing Lives" was held on the Cornell Tech campus December 2017, which included a related panel that featured the CMO at analytics software provider, SAS.
2. Susanne Bruyere referred Michael Fieldhouse, Director of the Dandelion (Autism at Work) Program at DXC Technologies to Frieda Poli, *Pymetrics* CEO, to explore a possible collaboration that would enable a more precise determination of how these screening tools perform with persons with Autistic characteristics. The two organizations have signed a formal contractual agreement as of spring 2018 to pursue this collaboration.

3. The YTI Team (Susanne Bruyere, Hassan Enayati, and Sarah von Schrader) will be submitting a proposal to the U.S. Office of Personnel Management Summit entitled “The Future of Federal Work: Theory, Policy, Adaption, and Challenge” to be held on December 18, 2018 in Washington, D.C. for a panel presentation on *“Improving employment outcomes for people with disabilities in the federal sector: The Role of AI and Private Sector Employer Practice Innovations.”* Collaborators include: Lori Foster, Head of Behavioral Science, Pymetrics; Kelly Trindel, Head of IO Science and Diversity Analytics, Pymetrics, Michael Fieldhouse, Director, Emerging Business and Federal Government, DXC Technology; Head of the (Autism) Dandelion Program, DXC Technology, Melbourne, Australia; and a U.S. government representative (TBD).

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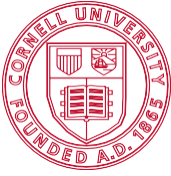
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